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CHARGE COUPLED IMAGING DEVICE TEST FACILITY

Following the Voyager mission, vidicon-tube technology for spacecraft imaging systems will be supplanted by solid-state Charge Coupled Devices (CCDs). The 800 x 800 matrix CCDs offer performances previously unattainable: very wide spectral response, extremely low light level sensitivity, dynamic range of over 4000 levels, and a near-absolute geometric stability. The mission objectives for both Galileo and the Space Telescope were established based on the new CCD capability.

Imaging CCDs vary widely in operating characteristics and are electronically complex to drive. The individual device optimization of the driving signals coupled with the greater performance range to be characterized has increased the amount of required computing capacity by a factor of 20 over that previously expended on vidicons.

To meet these needs, JPL assembled the CCD Screening and Test Facility. This new facility includes a very light-tight, reflection-free test room, a CCD camera enclosure, supporting optics and electronics, and an integrated computer setup that (a) controls, monitors, and records the operation of the CCDs, and (b) provides all the computation and products (printouts, plots, and hard copy images) required for analysis.

The computer system itself has involved several new technology developments, including (a) the incorporation of major imaging processes into main-frame micro-code, (b) a real-time software system capable of handling 3-1/2 megabits per second, and (c) the build-up of 16-bit hardware imaging display trace, and hard copy peripherals.

Pre-screening of a CCD requires 1-1/2 days of system time; a final screening requires 3 days. Both run in an automatic mode with the computer pausing only to allow directed target and/or light level changes. The established screening procedures require a technician for only half of daytime test hours and is allowed to run unattended (often overnight) for the remaining computing and analysis operations.

Figure (opposite page): Imaging CCD camera enclosure and control electronics.